



Standard Practice for Fabricating and Checking Aluminum Alloy Ultrasonic Standard Reference Blocks¹

This standard is issued under the fixed designation E 127; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This specification has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This practice covers a procedure for fabricating aluminum alloy ultrasonic standard reference blocks that can be used for checking performance of ultrasonic testing equipment and for standardization and control of ultrasonic tests of aluminum alloy products using pulsed longitudinal waves introduced into test material either by the direct-contact method or by the immersion method. A recommended procedure for checking blocks is described and calibration data for a number of reference blocks are tabulated. Statements concerning procedures are provided without a discussion of the technical background for the preference. The necessary technical background can be found in Refs. (1-14).²

NOTE 1—Practice E 428 and Guide E 1158 also describe procedures for selecting material, fabricating blocks, and checking response. Unlike this practice, there is no requirement for evaluation relative to a specified standard target.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

E 317 Practice for Evaluating Performance Characteristics of Ultrasonic Pulse-Echo Testing Systems Without the Use of Electronic Measurement Instruments³

E 428 Practice for Fabrication and Control of Steel Reference Blocks Used in Ultrasonic Inspection³

E 1158 Guide for Material Selection and Fabrication of Reference Blocks for the Pulsed Longitudinal Wave Ultrasonic Examination of Metal and Metal Alloy Production Material³

E 1316 Terminology for Nondestructive Examinations³

E 1324 Guide for Measuring Some Electronic Characteristics of Ultrasonic Examination Instruments³

3. Terminology

3.1 *Definitions*—For definitions of terms not specific to this practice, refer to Terminology E 1316.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *angular error*—the condition observed in ultrasonic tests of reference blocks when the response from the hole bottom is not maximum while the search unit is positioned to obtain either a maximum number of back reflections from a reference block or a maximum indication from its entry surface. Angular error results when the entry surface, hole bottom, and back surface are not parallel to each other.

3.2.2 *area-amplitude response curve*—a curve showing the relationship between different areas of reflecting targets located at a constant distance in an ultrasonic transmitting medium and their respective amplitudes of ultrasonic response.

3.2.3 *back reflection*—the indication, observed on the display screen of a test instrument, that represents the ultrasonic energy reflected from the back surface of a reference block.

3.2.4 *back surface*—the end of a reference block that is opposite the entry surface.

3.2.5 *entry surface*—the end of a reference block through which ultrasonic energy must pass when reflections from the hole bottom are obtained.

3.2.6 *hole bottom*—the flat reflecting surface in a reference block that is obtained by making the entire end of a drilled hole smooth and flat using best machining practices. The hole bottom is parallel to the entry surface of the block.

3.2.7 *hole size*—the diameter of the hole in a reference block that determines the area of the hole bottom.

3.2.8 *metal distance*—the distance in a reference block from its entry surface to the hole bottom.

¹ This practice is under the jurisdiction of ASTM Committee E-7 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.06 on Ultrasonic Method.

Current edition approved Dec. 10, 1998. Published February 1999. Originally published as E 127 – 58 T. Last previous edition E 127 – 95.

² The boldface numbers in parentheses refer to the list of references at the end of this practice.

³ *Annual Book of ASTM Standards*, Vol 03.03.